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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/688,678

10/17/2003

Sam Yang

303.660US6

2631

21186

7590

03/22/2005

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.

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EXAMINER

SMITH, BRADLEY

ART UNIT

PAPER NUMBER

2891

DATE MAILED: 03/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/688,678	YANG ET AL.	
	Examiner	Art Unit	
	Bradley K. Smith	2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>10/17/03</u> . | 6) <input checked="" type="checkbox"/> Other: <u>search notes</u> . |

DETAILED ACTION

Priority

1. If applicant desires benefit of a previously filed application under 35 U.S.C. 121, specific reference to the earlier filed application must be made in the instant application. For benefit claims under 35 U.S.C. 120, 121 or 365(c), the reference must include the relationship (i.e., continuation, divisional, or continuation-in-part) of the applications. This should appear as the first sentence(s) of the specification following the title, preferably as a separate paragraph unless it appears in an application data sheet. The status of nonprovisional parent application(s) (whether patented or abandoned) should also be included. If a parent application has become a patent, the expression "now Patent No. ____" should follow the filing date of the parent application. If a parent application has become abandoned, the expression "now abandoned" should follow the filing date of the parent application.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 13-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically the claims disclose "an oxynitride barrier layer having a barrier metal component, wherein the barrier metal component is different from the bottom electrode metal component or wherein the barrier metal

component is different from the top electrode metal component, wherein the oxynitride barrier layer is interposed between the dielectric layer and the bottom electrode or wherein the metal oxynitride barrier layer is interposed between the dielectric layer and the top electrode; and a second barrier layer, wherein the second barrier layer is interposed between the dielectric layer and the bottom electrode or wherein the second layer is interposed between the dielectric layer and the top electrode” the excessive use of “or “ results in “undue multiplicity”. See MPEP 2173.05(h) This claim will be treated with respect to the claimed material that is not addressed above.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3, 7-14, 18, 20-22, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raaijmakers et al. (US Patent 6,544,900) in view of Agarwal et al. (US Patent 6,201,276). With regards to claims 1, 10, 13, and 22, Raaijmakers et al. disclose a bottom electrode a metal oxide dielectric, a metal oxynitride barrier layer over the metal oxide layer and top oxide layer over the metal oxynitride layer. With regards to claims 2 and 14, Raaijmakers et al. disclose a tantalum oxynitride barrier layer (see column 5 lines 20-25). With regards to claims 7, 8, and 11 Raaijmakers et al. disclose

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at least one electrode comprises titanium nitride (column 17 lines 29-30). With regards to claim 9, Raaijmakers et al. disclose the bottom metal nitride electrode has the same metal as the first metal oxynitride. With regards to claim 9, 20 and 21, Raaijmakers et al. disclose the use of Tantalum Oxide (see column 17). However Raaijmakers et al. fails to disclose the formation of the metal oxynitride barrier layer between the dielectric layer and the top electrode. Whereas Agarwal et al. disclose the barrier layer between the dielectric layer and the top electrode. With respect to claim 3, Agarwal also disclose a tantalum oxynitride barrier layer. With regards to claim 12, 18, and 24, Agarwal disclose the top electrode is same as the bottom (element 14 is the same as element 19 therefore denoting the same material). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Raaijmakers and Agarwal et al. because the first and second diffusion barriers would keep material from transporting from the dielectric into the electrode (see Agarwal column 4 lines 64-67).

Claims 4-6, 15-17 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raaijmakers et al. (US Patent 6,544,900) in view of Agarwal et al. (US Patent 6,201,276) as applied to claims 1, 13, 22 above. Raaijmakers et al. disclose the formation of tungsten and titanium oxynitride. Therefore would have been obvious to one of ordinary skill in the art at the time the invention was made to tailor the ranges of MO_xNy wherein x ranges from approximately 0.05 to approximately one-half the maximum valence value of the metal component M minus 0.05 and y ranges from approximately 0.1 to approximately the maximum valence value of the metal component

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M minus 0.1. as there is no statement denoting the criticality of the desired range, and forming the a metal oxynitride could be performed by one of ordinary skill (Raaijmakers et al. column 17).

"In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)

Allowable Subject Matter

6. Claim 19 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

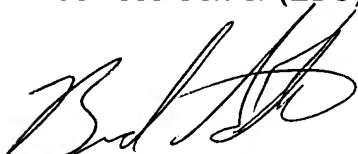
7. The following is a statement of reasons for the indication of allowable subject matter: the prior art of record within the context of the entire claim neither teaches nor suggest making both the top and the bottom electrode being comprising titanium nitride.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bradley K. Smith whose telephone number is (571) 272-1884. The examiner can normally be reached on 10-6 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on (571) 272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Brad Smith', is positioned above the printed name.

Brad Smith
Primary Examiner
Art Unit 2829